

Track Fit Code Status

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Matrix Lookup Table Algorithm

$$\phi(r) = \frac{b}{r} + \kappa r + \phi_0, \quad \vec{p} = (b, \kappa, \phi_0)$$

♠ 3 parameters (p_i)

♠ 2 CFT hits + 4(3) SMT hits (r_j, ϕ_j)

$$p_i = \sum_j M_{ij} \phi_j, \quad M_{ij} = f_i(r_j, \sigma_j)$$

♠ Use 160 ϕ slices (SuperRoads) where $r_j \approx r_{\text{layer}}$ to limit number of matrices M_{ij}

CFT/SMT Coordinate LUTs

Radius (50 μm)	Barrel	Layer	Hit ϕ	Field
27..22	21..19	18..16	15..0	Bits

- ♠ SMT LUT stores residual radius (precision, small LUT yields reference radius per layer)
- ♠ Store ϕ range per TFC (precision, small LUT provides reference ϕ per TFC) :
“slight” problem in that ϕ range currently overflows 16 bits due to ladders extending beyond 37.5°

Lookup Tables Status

- ♠ 12 inverse matrix LUTs, with packed 16 bit integers, one for each TFC
- ♠ 6 SMT coord-conv LUTs, one for each crate → change to 12, one for each TFC
- ♠ CFT coord-conv LUTs cover whole detector, stored in DSP data memory
- ♠ P_T bin LUT stored in DSP memory converts curvature κ to P_T bin, for output

Integer Fit Algorithm Status

- ♠ C++ version converted to C for running on DSP - compiles and runs in TI Simulator
- ♠ C++ wrapper provides bit-wise input information expected from FRC and STC and performs SMT coord conversion
- ♠ C code compiles within tsim_l2stt, and runs: compare 59% tracking efficiency to nominal 67% - known problems remain

Integer Fit Algorithm Tasks

- ♠ Rescale the integer values to fix SMT LUT overflow problem and remove last 3 divisions from χ^2 calculation (flexibility)
- ♠ Handle in wrapper code the case where the FRC track goes to 2 neighboring TFCs
- ♠ Include beam spot correction and impact parameter significance computation
- ♠ Update SMT LUT to handle 7-bit sequencer ID and break sextants into TFCs